



LASER INTERFEROMETER GRAVITATIONAL WAVE OBSERVATORY

*LIGO Laboratory / LIGO Scientific Collaboration*

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Advanced LIGO

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## Monitor Photodiodes for SQZ

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## List of RF Photodiodes

| Name                      | Location   | Type                       | RF Chain  | Comment                |
|---------------------------|------------|----------------------------|-----------|------------------------|
| Newport 1611FS-AC:        |            | <a href="#">Commercial</a> |           |                        |
| FIBR_MIXER                | SQZT0/FSS1 | 1611                       | TTFSS     | Laser/fiber locking PD |
| Broadband Photodetectors: |            | <a href="#">E1200428</a>   |           |                        |
| SHG_TRANS_RF35            | SQZT0/SHG  | BBPD                       | 2ch demod | SHG locking (IR)       |
| OPO_REFL_RF80             | SQZT7/OPO  | BBPD                       | 2ch demod | OPO locking (GR)       |
| LSC RF Photodetectors:    |            | <a href="#">E1400099</a>   |           |                        |
| CLF_REFL_RF6              | SQZT7/CLF  | ALIGO                      | 2ch demod | CLF phase. locking     |
| FC_REFL_RF40              | SQZT7/FC   | ALIGO                      | 2ch demod | FC locking             |
| Existing OMC DCPD:        |            | <a href="#">E1300521</a>   |           |                        |
| OMC_TRANS_RF3             | In-vac     | ALIGO                      | 2ch demod | Squeeze angle locking  |
| Thorlabs PDA100A:         |            | <a href="#">Commercial</a> |           |                        |
| FC_BEAT_RF1               | SQZT7/FC   | PDA100A                    | TBD       | FC beat note           |
| Homodyne Photodetector:   |            | <a href="#">E1700135</a>   |           |                        |
| HD_DIFF_RF3               | SQZT7/HD   | ALIGO                      | 2ch demod | LO locking/diagnostics |

## List of Quad Detectors

| Name               | Location    | Type                     | Chain | Comment              |
|--------------------|-------------|--------------------------|-------|----------------------|
| New 105 kHz Quads: |             | <a href="#">E2000502</a> |       |                      |
| RLF_REFL_A         | In-vac      | ALIGO                    | RLF   | FC locking/alignment |
| RLF_REFL_B         | In-vac      | ALIGO                    | RLF   | FC locking/alignment |
| Green Quad:        |             | TBD                      |       |                      |
| FC_TRANS_A         | SQZT8/green | ALIGO                    | QPD   | FC alignment         |
| FC_TRANS_B         | SQZT8/green | ALIGO                    | QPD   | FC alignment         |

## List of DC monitor photodiodes

| Name                                       | Location   | Type    | S | F | W | Comment                      |
|--|------------|---------|---|---|---|------------------------------|
| <b>4-chn Generic PD interface (SQZT0):</b> |            |         |   |   |   |                              |
| FIBR_PD_DC/LF                              | SQZT0/FSS1 | 1611    | × | × | × | DC of laser/fiber locking PD |
| SHG_TRANS_DC/LF                            | SQZT0/SHG  | BBPD    | × | × | × | DC of SHG locking (IR)       |
| LASER_IR_DC/LF                             | SQZT0/PD1  | PDA100A | × | × | × | Power of SQZ laser           |
| SHG_GR_DC/LF                               | SQZT0/PD2  | PDA100A | × | × | × | SHG green power (GR)         |
| <b>4-chn Generic PD interface (SQZT7):</b> |            |         |   |   |   |                              |
| CLF_TRIG_DC                                | SQZT7/PD3  | PDA100A | × | × |   | Trigger PD CLF path          |
| OPO_IR_PD_LF                               | SQZT7/IR   | PDA100A | × | × |   | DC of OPO transmitted (IR)   |
| CLF_REFL_DC                                | SQZT7/CLF  | ALIGO   | × |   |   | DC of CLF refl. Locking      |
| OPO_REFL_DC                                | SQZT7/OPO  | ALIGO   | × |   |   | DC of OPO refl. Locking (GR) |
| <b>DC Outputs of LSC RF PD interface:</b>  |            |         |   |   |   |                              |
| CLF_REFL_LF                                | SQZT7/CLF  | ALIGO   |   | × | + | DC of CLF refl. locking      |
| OPO_REFL_LF                                | SQZT7/OPO  | ALIGO   |   | × | + | DC of OPO refl. locking (GR) |
| FC_REFL_LF                                 | SQZT7/FC   | ALIGO   |   | × | + | DC of FC refl. locking (GR)  |
| FC_BEAT_LF                                 | SQZT7/FC   | ALIGO   |   | × | + | DC of FC/OPO beat note (GR)  |
| <b>Homodyne interface:</b>                 |            |         |   |   |   |                              |
| HD_B_DC                                    | SQZT7/HD   | ALIGO   |   | × | + | PD B of homodyne             |
| HD_DIFF_DC                                 | SQZT7/HD   | ALIGO   |   | × | + | Difference of homodyne PDs   |
| HD_A_DC                                    | SQZT7/HD   | ALIGO   |   | × | + | PD A of homodyne             |
| <b>Unamplified DC Monitors:</b>            |            |         |   |   |   |                              |
| SHG_FIBR_REJECTED_DC                       | In-vac     | PD      | × |   |   | Rejected pump power          |
| CLF_FIBR_REJECTED_DC                       | In-vac     | PD      | × |   |   | Rejected CLF power           |
| FC_FIBR_REJECTED_DC                        | In-vac     | PD      | × |   |   | Rejected green FC power      |
| OFI_A_REJECTED_DC                          | In-vac     | PD      | × |   |   | OFI monitor HAM7             |
| OFI_B_REJECTED_DC                          | In-vac     | PD      | × |   |   | OFI monitor HAM5             |
| FIBR_TRANS_DC/LF                           | SQZT0/DC1  | SM1PD1A | × | × | × | Transmitted by laser fiber   |
| FIBR_REJECTED_DC                           | SQZT0/DC2  | SM1PD1A | × |   |   | Rejected after laser fiber   |

|                                |            |         |   |   |   |                              |
|--------------------------------|------------|---------|---|---|---|------------------------------|
| CLF_LAUNCH_DC                  | SQZT0/DC4  | SM1PD1A | × |   |   | Injected into CLF fiber      |
| CLF_REJECTED_DC                | SQZT0/DC3  | SM1PD1A | × |   |   | Rejected before injection    |
| SHG_LAUNCH_DC                  | SQZT0/DC7  | SM1PD1A | × |   |   | Injected into pump fiber     |
| SHG_REJECTED_DC                | SQZT0/DC6  | SM1PD1A | × |   |   | Rejected before injection    |
| SEED_LAUNCH_DC                 | SQZT0/DC5  | SM1PD1A | × |   |   | Seed beam injection          |
| LO_LAUNCH_DC                   | SQZT0/DC8  | SM1PD1A | × |   |   | LO beam injection            |
| FC_FIBR_LAUNCH_DC              | SQZT0/DC11 | SM1PD1A | × |   |   | Injected into FC green fiber |
|                                |            |         |   |   |   |                              |
| OPO_REFL_REJECTED_DC           | SQZT7/DC9  | SM1PD1A | × | × | × | Rejected OPO refl. power     |
| OPO_TRANS_DC/LF                | SQZT7/DC10 | PDA100A | × | × | × | Trans. green OPO power (GR)  |
| FC_REFL_REJECTED_DC            | SQZT7/DC12 | SM1PD1A | × | × | × | Reject. FC REFL power (GR)   |
| FC_BEAT_REJECTED_DC            | SQZT7/DC13 | SM1PD1A | × |   |   | Reject. FC BEAT power (GR)   |
|                                |            |         |   |   |   |                              |
| SPARE_A_DC                     | TBD        | TBD     | × |   |   | Spare (SQZT0)                |
| SPARE_B_DC                     | TBD        | TBD     | × |   |   | Spare (SQZT7)                |
| <b>Trigger PD:</b>             |            |         |   |   |   |                              |
| SYS-MOTION_C_SHUTTER_H_TRIGGER | SQZT7/PD3  | PDA100A | × |   |   | Trigger PD CLF path          |

S: Slow controls readback; F: Fast DAQ readback; W: Whitened readback (×: standard whitening, +: custom whitening)